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XXXI.—*On the Occurrence of Palms and Bambus, with Pines and other Forms considered Northern, at considerable elevations in the Himalaya.* By MAJOR MADDEN, H.E.I.C.S., F.R.S.E., M.R. Dublin Society\*.

HAVING resided for several years in the British portion of the Himalaya Mountains, and more especially in the province of Kemaon, which borders on the Nepalese territories, I possessed opportunities for examining its botany, which up to that period had been investigated by native collectors only, and was thus enabled to determine the western extension of a number of plants, the existence of which had hitherto been supposed to be limited by Nepal. Among these were several palms, on the distribution and association of which, and the inferences to be drawn therefrom, I propose to lay before the Botanical Society a few facts for its consideration.

1. The most common of these palms is one which Dr. Royle has designated *Phœnix humilis*, and which he supposes may be identical with *Ph. acaulis* of Roxburgh, and which is probably a mere variety of *Ph. sylvestris*, the wild date tree of India, useless for its fruit, but yielding abundance of sap, which, in Bengal, is largely employed in the manufacture of sugar. *Phœnix humilis* occurs in great abundance and beauty in the forest belt all along the base of the mountains, up the warm valleys of the great rivers, and ascends the mountains to 5500 feet, being plentiful at that elevation in the vicinity of Almorah, the capital of the province, and in one or two instances which came under my observation reaching even a thousand feet higher. In its dwarfed form, *Phœnix humilis* is found at least as far N.W. as the Sutluj river, and is the only one of the family which, probably

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owing to the aridity of the climate, is to be met with in that region\*. In several places in Kemaon (Dwarahat for instance) I noticed its arborescent state (*Phoenix sylvestris*), attaining the height of 40 to 50 feet at an elevation of 5000 feet above the sea, surrounded at no great distance by extensive forests of *Pinus longifolia* and *Quercus incana*, the inferior limit of the former tree being about 2000 feet above the sea-level.

2. *Harina* (*Wallichia*) *oblongifolia*, a very beautiful palm, first described by Mr. Griffith, and observed by him in Assam. This I found in abundance in the damp and very warm valleys of the Surjoo and Kalee rivers, near the Nepalese frontier at Burmdeo, and for many miles up the interior, but never ascending higher than 3500 or 4000 feet on the mountain sides, and only where the localities afforded abundance of shade and moisture. To the N.W. of the province it occurred in the Bumouree Pass, and in the valleys below the recently formed station of Nynee Tal; and still further west, it just reaches the Patlee Doon, a valley in the S.E. of Gurhwal, beyond which a careful examination failed to detect any trace of it. This palm, the leaves of which bear a great resemblance to those of *Corypha* or *Arenga*, and afford a very durable thatch, forms dense thickets, and never attains the arborescent form.

3. *Chamærops Khasyana* (Griffith), of which a plant raised from seeds sent home in 1847 is before the Meeting, was first met with and described by Mr. Griffith in the Khasya (or Cosseeah) Hills between the plains of Bengal and the Burhampootra river. As this eminent botanist remarks, it comes very near *Ch. Martiana* of Wallich, a native of Nepal, at 5000 feet elevation; and further researches will, in my opinion, tend to the conclusion that they are, in fact, one and the same species.

Mr. Griffith's description as detailed in the Calcutta 'Journal of Natural History' is appended, with a few observations of my own to justify the opinion which I have formed of their identity.

As defined by this botanist, *Chamærops Khasyana* occurs in four localities of Kemaon, besides another (the Dhuj mountain), where I was informed on good native testimony of its presence in considerable quantities. Of these stations, the most remarkable for its elevation and the abundance and perfection of the palm is the Thakil mountain, named from it, an enormous mass

\* Advancing to the N.W. however, in the Khybur Pass, and generally in the low, arid, mountainous parts of Eastern Afghanistan and Beloochistan, in north latitude 26°-35°, we find abundance of *Chamærops Ritchiana*, Griffith, *Maizurrye* of the Afghans, a dwarf species seldom above 2-3 feet high, and if not identical with, closely allied to *Ch. humilis*, the only European palm flourishing in very nearly the same latitudes, and in a very similar climate.

of magnesian limestone reposing on clay-slate, in the eastern extremity of Kemaon, its loftiest summits attaining the elevation of 8221 feet above Calcutta: the base of the mountain, as marked out by the deep gorges of the Surjoo and Kalee rivers, only 1500 feet above the sea, and occupied by a tropical vegetation, cannot be under sixty miles in circuit. The zone of *Pinus longifolia*, which forms vast forests on its declivities, extends vertically from 2000 to about 7000 feet; the summits, for perhaps 400 feet, are denuded of all arboreous vegetation, and exhibit, as usual in the Himalaya, bare tracts of mere rock\*, or meadows of luxuriant grass (*Rhaphis Roylei*, *Arundinella, hirsuta*, &c.), *Ophelia*, *Gentiana*, *Saxifraga*, *Primula*, &c. Below these comes the zone where flourish luxuriant forests of *Quercus incana*, *lanata* and *floribunda*, *Acer*, *Ilex*, *Pavia*, *Rhododendron*, *Andromeda*, *Symplocos*, *Taxus*, *Berberis*, and other northern forms; amidst these, in damp shady glens on the north and south-east, but chiefly on the north-west exposure, the *Chamærops* is found in great numbers, forming clumps and rows, the trees rising from 30 to 50 feet high, each with its superb crown of large flabelliform leaves, rattling loudly to the breeze. At 6 feet from the ground the stems are 2 feet in circumference, but become thicker above. The flowers appear in April and May, and the fruit, which is of a dark glossy blue, about half an inch long, ripens in October, and at the period of my visit (March 20, 1847) lay strewed in abundance at the foot of the trees, where large beds of snow remained unmelted, and where rich beds of *Primula denticulata* were in full bloom. The lowest specimens observed were at about 6500 feet, but they reached their perfection in numbers and stature at 7800, from which we may fairly infer, that had circumstances been favourable by the addition of some thousand feet to the altitude of the mountain, they would have ascended considerably higher. But in the site actually occupied by them, the mean annual temperature cannot be under that of London †, and though the summer be very warm, snow generally covers the ground from November till March. On the ascent of the mountain, *Phoenix* was abundant both in its dwarf and arboreous forms at 4000 feet, while *Harina* forms extensive thickets in the river valley at its base.

The presence of *Chamærops* at such an elevation has its parallel in America, where, on the Andes of Quindiu and Tolima, in about

\* A phænomenon, by the way, which illustrates the prophecy in Micah, iii. 12. "Therefore shall Zion for your sake be plowed as a field, and Jerusalem shall become heaps, and the mountain of the house as the high places of the forest."

† *Ch. Martiana* has proved perfectly hardy at 19° Fahrenheit during the past winter. (Gardeners' Chronicle, April 9, 1853, p. 230.)

4° north latitude, Humboldt discovered *Ceroxylon Andicola* at from 5800 to 9500 feet, associated with a genus of Bambusidæ (*Chusquea*), which, as we shall presently observe, has more than one representative in the Himalaya also. He also informs us that on the western slope of Mexico, *Corypha dulcis* is mixed up in the forests of *Pinus occidentalis*.

*Chamærops Khasyanu* appears also to occur on Dhuj mountain, a few miles north-east of the Thakil; on the Kalcemoudee range between the rivers Ramgunga and Goree; and in the valley of the Surjoo near Bagesur. In the north-west of Kemaon I discovered dwarf specimens in two localities, viz. at the base of the Sutboonga mountain south-east of the Gagur Pass, in very dense forest at 6500 feet elevation; and on the Berhoola, a spur of Bhutkot mountain, considerably further in the interior, and at about 8000 feet elevation. In neither of these stations could I find any examples with stems beyond a foot or two high, and this circumstance, as well as the fact that inquiry and investigation failed to detect any trace of their extension to the north-west, leads me to conclude that these points form the limit of the species in longitude. I must add, however, that in a paper addressed to Baron von Humboldt, the late Dr. W. Hoffmeister states that in the province of Gurhwal, on the descent from Dhunpoor to the Alacañanda river (the main arm of the Ganges), he came upon a forest of *Pinus longifolia* at 6800 feet; "and it is very remarkable that the *Chamærops Martiana* (Wallich) is here in immediate contact with it, some tall stems of that palm being even scattered in among the pines" (Travels in Ceylon and India, English Translation, p. 495). But in 1849 I went over this very ground, and on the most careful scrutiny no such trees were to be seen or heard of; and it is certain that in his letters written on or near the spot, as well as in the 'Synopsis of Vegetation' (pp. 307, 507) for this very route, no palm is mentioned except *Phoenix humilis*, which I myself also found to be common and occasionally arborescent; and such I doubt not is what Dr. Hoffmeister really intended. I had the pleasure of meeting him at Simla the same year (1845) that he made his journey, and being then engaged in some researches on the Coniferæ of the Himalaya, and having never then visited Kemaon and south-east Gurhwal, he very kindly furnished me with some brief memoranda on their occurrence in those districts; and here too I find *Phoenix humilis* alone mentioned in the locality specified. Hence I am justified in considering the stations on Bhutkot and Sutboonga in Kemaon, as the most westerly at which *Chamærops* has hitherto been observed\*. A species of *Musa* (plantain or

\* A species of *Chamærops*, called Hemp Palm, has recently been discovered by Mr. Fortune in the northern provinces of China, Chekiang and

banana) is indigenous and abundant at a considerable elevation (7000 feet) in the eastern Himalaya north of Assam, and nearly to the same level in Sikkim: I have observed it only in one spot in Kemaon, the Bylchheena Pass, at about 4000 feet elevation, and was told that it occurred much more abundantly at a short distance, in the valley of the Kalee; but as I had not time to verify the report, it need not be more than thus briefly alluded to\*.

There is however one more genus of the Monocotyledones, and allied to the Palmis, worthy of introduction here, from the very great elevation to which it reaches in the Himalaya, and from its affinity and resemblance to the tropical genus *Bambusa*; I allude to the genus *Arundinaria* of the section *Bambusidæ*, of which at least four very distinct species occur in the Himalaya, and which have been referred to a new genus (*Thamnocalamus*) by my friend Dr. Falconer. They are familiarly known to European residents in the mountains as the "hill bamboo," and to the mountaineers of Gurhwal as the "Ringal," altered to "Ningala" in Kemaon. Of these, the lowest species in the vertical section is *Arundinaria falcata*, growing from 3500 to 8500 feet, and, like the rest, forming extensive and close thickets. The second is the *Arundinaria utilis* of Mr. Edgeworth, the Deo Ningala (or divine Ningala) of the natives, occurring from 7000 to 9000 feet. The third is variously named Geewasa, Purkha, Jhoomra, Suura (Jurboota in Nepal, where all these species are also found); I am not aware that this is yet described; but its principal difference from the next is that the stems are solitary, not in clumps: it occurs from 7000 to 10,000 feet. The fourth species is the *Tham*, in Nepal Khaptur, also undescribed, at least unpublished, which has its zone from 8500 to 11,500 feet; only 500 feet, or less, below the inferior limit of the perpetual ice of the glaciers,

Kiangnan, where the winters are excessively cold. Plants sent to Kew in 1848 have "braved unharmed, and unprotected by any sort of covering, the severe winter now passed, 1849-1850" (Bot. Mag. March 1850, quoted in Proceedings of Bot. Soc. May 13, 1852). If this be *Ch. Martiana*, it proves the great extension and hardness of that species; if different, it affords an additional corroboration of the line of argument adopted in the text.

\* I am not aware of the exact locality in Nepal of the arborescent fern, *Arsophila gigantea*, but near Darjeeling in Sikkim, immediately to the east of that country, Dr. Hooker states that it flourishes between 4000 and 7000 feet above the sea; 6500 being there the upper limit of the palms; a species of *Caryota* reaching up to 6000, and *Calamus* as high, forty miles within the mountains; while *Pothos*, *Musa*, *Ficus*, *Piper* have species from 2000 to 7000 feet, and *Ficus* one species to 9500. But in the humid equable climates of the southern hemisphere, Australia, New Zealand, Tasmania, the arborescent ferns reach a much higher parallel of latitude, and attain the height of 40-50 feet.

and, with the second and third species, occupying nearly the entire zone of *all* the coniferous trees of the Himalaya, *Pinus longifolia* excepted, which is below them\*. The most useful and remarkable of the four is *Arundinaria utilis*, which grows in fine clumps of many slender stems, from 20 to 40 feet high, extremely durable and applied to a great variety of purposes. The plant, like the truc bambu, flowers but rarely, and the stems then die and fall. I was fortunate enough to collect considerable quantities of the seed near Pindree in 1846, which has, I believe, produced all the plants living in Great Britain and Ireland: three years afterwards, in a second visit to the alpine Himalaya, the stems which had fallen and died in that season were still perfectly sound, and I believe that the third and fourth species are nearly if not altogether as durable, but they never attain the stature of the Deo Ningala.

The bearing of the foregoing facts on the phænomena of geology is so obvious as to require little comment; the considerations most pressing on our attention being the necessity of great caution in drawing inferences as to the nature of climate from the presence of supposed tropical forms in ancient rock formations, and the facility with which we can now account for the juxtaposition of those forms with those of known temperate regions.

Here are palms, bambus, bananas growing amongst and above pines, firs, cedars, cypresses, yews, oaks†, maples, hazels, ash,

\* "Bamboos in the general acceptation of the term (for remotely allied genera bear the same trivial English name) occur at all elevations below 12,000 feet, forming even in the pine woods, and above their zone, in the skirts of the Rhododendron scrub, a small, and sometimes almost imperious jungle." (Dr. J. D. Hooker, Excursion to Tonglo Mountain in Sikkim: Journal As. Soc. Bengal, May 1849, p. 424.)

† It must be remarked, however, that the oak, the pine, and other common Northern forms are even less justly adduced as the criteria of a cold climate than the palms are of a hot one. Our own *Quercus robur*, the Himalayan *Q. semecarpifolia*, with several Mexican and other species, flourish exclusively in low temperatures, but the great majority of the Indian species are natives of the moist warm regions of Nepal, Silhet, the Garrow and Khasya hills, Chittagong, Tenasserim, Martaban, Penang, &c. Such are sixteen out of the seventeen species enumerated by Roxburgh in the 'Flora Indica.' Professor Liebmann remarks (Oak-Vegetation of America, translated in Hooker's Journal of Botany and Kew Miscellany for 1852, p. 322): "It has hitherto been a prevailing notion that the oak-form is peculiarly characteristic of the temperate zone. But whether we look at the number of species, the beauty of the forms, or the size of particular organs (leaves, fruits, cups), we shall find their maximum in the tropical zone, that is, in the Sunda Islands of the Old World and tropical Mexico of the New." So also in the Himalaya, *Ulmus erosa* occurs at from 8000 to 10,000 feet; another species, erroneously as I think identified with the Chinese *Ulmus virgata*, between 6000 and 7000 feet; a third in the hot

and almost all the deciduous trees proper to a cold region of the globe. During violent storms and heavy rains it cannot but

valleys of Kemaon at 3000 feet; and a fourth, *Ulmus integrifolia*, allied to the last, abounds at the base of the mountains and all over the plains of India down to Coromandel and Guzerat. In the same warm plains we find *Ranunculus sceleratus*, as common and as luxuriant down the Ganges to Bengal as in Scotland: a *Clematis* (*C. Gouriana*) is so named from the old capital of Bengal where it was first discovered: a fine rose (*R. involucrata*) is wild in Behar at the foot of the Rajmahal hills: a blackberry (*Rubus distans*, Don) is found below the base of the Himalaya; while *Potentilla supina* and *Heynii* abound along the Ganges to Calcutta. Of the Coniferæ, several genera and species are confined to high temperatures; e. g. *Pinus longifolia* grows well at Calcutta, but perishes in our climate. *P. sinensis* flourishes on the coast of China, at Canton, and south of it. "One true pine is shown to be a native of Sumatra, *Pinus Merkusii*, Jungh. et De Vriese, Pl. Ind. Or. fasc. 1. tab. 1, probably the *P. Finlaysoniana* of Wallich, Cat. no. 6062, from Cochin China" (Kew Miscellany and Journal of Botany for April 1851, p. 127). The genera *Dammara*, *Podocarpus*, *Dacrydium*, have their greatest number of species in Nepal, Khasya, Malacca, Java, Penang, and Amboyna; even *Juniperus* has a species in Barbadoes (*J. Barbadosensis*), and another (*J. aquatica*) at Canton; while *Cupressus glauca* is a native of Goa; *C. sempervirens* is quite at home at Agra, with *Thuja orientalis*. The Coniferæ, in short, are, as Dr. Lindley remarks (Vegetable Kingdom), "natives of various parts of the world, from the perpetual snows and inclement climate of Arctic America to the hottest regions of the Indian Archipelago."

On the other hand, several tropical genera besides those noted in the text have species at great altitudes in the mountains. Thus *Indigofera* has in the Himalaya *Indigofera pulchella* at 5000 feet, *I. heterantha* at 7000, and *I. Gerardiana* (*Dosua*, Don?) to 10,000; all large shrubs and forming extensive thickets. The beautiful *Acacia Julibrissin* ascends to 6500 feet. Dr. Hooker remarks (Journal of As. Soc. Bengal for May 1849, p. 426), that the general prevalence of bamboos, figs, and their allies the nettles, is a remarkable feature in the botany of the Sikkim Himalaya up nearly to 10,000 feet; "one species of this very tropical genus (*Ficus*) ascends almost to 9000 feet, on the outer range of Sikkim;" as *F. laurifolia* does to 6500 feet in the N.W. Himalaya. Gardner notices with surprise and admiration the prevalence of numerous species of this genus forming splendid trees in the forests of the Organ mountains, near Rio Janeiro. Of Laurineæ, *Cinnamomum* has one species in Sikkim to 8500 feet, and *Tetranthera* another to 9000 (Hooker, l. c.); while in the N.W. Himalaya, *Daphnidium*, *Litsæa*, &c. have species to the same elevation. In Sikkim, Dr. Hooker mentions *Balanophora* with species at 6000, and one even to 8000 feet; and Dr. Thomson found it near Kotgurh, thirty miles north of Simla, between 6000 and 7000. Of the generally tropical family Cinchonaceæ, the true Cinchonas reach 10,000 feet or more in South America; just as in the Himalaya I found *Leptodermis lanceolata* at 10,000 feet on Dudutoli mountain in Gurhwal. But these anomalies are far too numerous for a note. I must add, however, that the physical conformation of the Himalaya of itself greatly favours the probability of tropical and temperate forms becoming associated by storms, torrents, &c.; for while the deep warm valleys which penetrate fifty or sixty miles towards the summit line are filled with a tropical or semitropical vegetation, the lofty ranges which divide them are clothed with forests of the temperate types.

happen that some of these should be overthrown and buried beneath the huge landslips so prevalent at such crises, and there become fossilized to the perplexity of a succeeding race of geologists ! Their difficulties and their errors might easily be enhanced and fortified by the addition of a very possible contingency in the animal kingdom, viz. the presence of the larger carnivora. The leopard is a constant and only too troublesome inhabitant of the Himalaya up at least to 9000 feet, and commits great depredations on the flocks. The tiger, too numerous at the base, and in the hot valleys of the Kemaon and Gurhwal mountains, is, I think, merely an occasional, though by no means very rare, visitor at that altitude in search of the larger deer ; I have myself several times seen their footprints on the snow, with other marks of their having passed between 8000 and 9000 feet ; at which elevation one friend of mine met a tiger in a thicket of Deo Ningala ; and another who was on a shooting excursion fired at and wounded one up as high as 10,000 feet. Now, it is not at all impossible that one or more of these should perish in a storm and be buried in the same deposit as the palms and conifers, &c., and thus render the problem greatly more complicated.

So much for the mountains and the subtropical forms which flourish there ; but the same result will be equally brought about in the hot plains of India by the transport of the northern plants through the agency of rivers and torrents. The Khasya hills, where Griffith first met the *Chamærops*, rise like a wall from the flats of Bengal, and in many parts of the Himalaya the exterior range rises in precipices to the height of 6000 to 8000 feet, clothed to the brink with oak, ash, maple, pine, cypress, Siberian crab, &c. : immediately beneath is the vegetation of the tropics. The cliffs are wearing slowly back, and many of these oaks, &c. must be carried down by their own weight and by the torrents to form the most heterogeneous mass with the *Naucleas*, *Cinchonas*, *Vaticas*, of the *Terai* Belt.

These reflections are forced on the mind at once in such localities as Nynce Tal Station in Kemaon.

But we may safely extend our view to the lower course and deltas of the three great rivers which ultimately drain the Himalaya, the Indus, the Ganges, and the Burhampootra. Mooltan and Sindh, on the first of these, are in many places covered with groves of *Phoenix dactylifera* and a forked palm, which I suppose to be *Hyphæne Thebaica*, the Doom palm of Upper Egypt : Behar on the Ganges, in like manner, abounds in the fine palm *Borassus flabelliformis* ; and in Bengal, *Phoenix sylvestris* and *paludosa*, *Areca Catechu*, and *Cocos nucifera*, often form great woods. Annually, during the floods, the great rivers bring down num-



bers of the Himalayan Coniferæ, which, were the country uninhabited, would be carried to the sea and deposited with the spoils of the deltas themselves in the new formations, which the mud and silt of these great rivers are known to be slowly depositing\*. We should thus be presented with the association of palms and pines, the occurrence of which is so well ascertained in the coal-measures and far up into the tertiary series; and even though we were able to demonstrate that these trees were *in situ*, we have still the alternative to dispose of, that to the present day palms and pines actually flourish on the same ground, before we can legitimately argue from their juxtaposition any anomalous conditions of the atmosphere, differing greatly from our present experience. The existence of the mammoth in the cold regions of Northern Asia, provided with hair and fur to protect it from the severity of the climate, might, *à priori*, warrant a presumption of an analogous fact in the vegetable kingdom, namely the existence of palms, or other tropical families, so organized as to enable them to contend with a very low temperature.

This phænomenon now rests on actual observation, and is quite in accordance with facts in other branches of natural history, zoology, ornithology and conchology, where several familiar instances might be alleged of tropical genera with few, or even solitary species extending far into the arctic and antarctic zones, where their occurrence and discovery immediately and extensively modified, or even reversed, conclusions drawn from the presence in geological formations of cognate forms. And such uncertainty must continue to rest on the result of our researches, till, abandoning the maxim, absurd in science, that "the exception proves the rule," we cease to look too exclusively to genera, and allow to species their proper place and weight in our systems.

*Description of the Palm referred to in the Text, from Griffith.*

#### CHAMÆROPS KHASYANA.

"*Nov. Spec.* Trunco mediocri, petiolis per totam longitudinem denticulato-scabris, fibrillitio e fibris erectis rigidiusculis lamina reniformi-flabelliformi, profunde 60-65 partita laciniis induplicatis

\* I can speak from observation as to the number of pines brought down by the Sutluj; and as long since as the age of Alexander the process must have been the same, for the fleet with which he descended to the mouth of the Indus was constructed of them. There is a regular business in catching the floating trees, and not a very safe one; for such is the impetuosity of the rivers, that the men employed are sometimes drawn by the timber (to which they have fixed large hooks) into the current, and are infallibly lost.

bilobis vel bipartitis lobis centralium brevibus obtusis recurvis, spadice (fructus) bipedali ramis primariis tribus, spathis subternis (basilaribus 2 ramo 1) pedunculum communem omnino tegentibus, fructibus oblongis livido-cæruleis.

“*Hab.* Khassya hills, on precipices at Moosmai and Mamloo. Alt. 4000 feet: not observed in flower or fruit.

“*Desc.\** A palm of moderate height (the specimen measures 9–10 feet), the trunk 5 inches in diameter in the thickest parts, obscurely annulate. Under the *crown*, which is thick, is an oblong mass (2 feet long) of flattened bases of petioles and their retia, which are of stiff fibres.

“Leaves about  $3\frac{1}{2}$  feet long; *petiole* 18 inches long, with irregular denticulate margins; *lamina* flabelliform reniform (so is the entire part of the leaf), 2 feet long by  $3\frac{1}{2}$  feet wide; divisions about sixty-five, the lateral ones shortest, 12 to 14 inches long, but the deepest divided (viz. to within 5–6 inches of the apex of petiole), linear, their segments  $1\frac{1}{2}$ –2 inches long, narrow, acute; central, ensiform, reaching to within 10–12 inches of the apex of the petiole, about 16 inches long, shortly and obtusely bilobed, segments about half an inch long, with recurved points; intermediate divisions also ensiform, about 18 inches long, their segments narrower and deeper than those of the central; young leaves covered with thick, white, paleaceous tomentum.

“*Spadix* (fruit-bearing) 2 feet long, nodding, compressed; the lower half concealed by the *spathes*, of which there are three, two common ones, and one to one of the main branches. They are coriaceous, brown, with oblique mouths and bilobed limbs: the lowest is about a foot long. *Branches* of the *spadix* quite exserted, quite naked, the terminal one quite dichotomous; divisions many.

“*Spikes* 4 to 6 inches long.

“*Fruit* scarcely baccate,  $\frac{1}{2}$  inch long,  $2\frac{1}{2}$  lines broad, solitary or 2–3 together, but of distinct carpels, oblong, inequilateral, obliquely apiculate at the apex, surrounded at the base by the calyx, which has a stout cylindrical base, and three deep, broad, oblong divisions, by a corolla of three cordate ovate petals, equal in length to the calyx, and by six sterile stamina; on one side may be found two abortive villous ovaries. *Seed* oblong, with the ventral face rather deeply furrowed, the furrow not reaching quite to the apex, reniform on a transverse section. *Albumen* with a scaly surface, along this line presenting a cavity filled with spongy tissue; horny, otherwise equal. Embryo in the centre of the dorsal face.

\* Entire? specimen of a trunk and crown, and two fruit-bearing spadices; these have been unnoticed since the return of the Assam Deputation in 1836: seeds since received have germinated.

“This species is closely allied to *C. Martiana*; it differs in its shorter stature, the petioles toothed throughout, in the nature of the rete and the texture of the leaves, which is more like that of *C. humilis*. The paleaceous tomentum much more developed, and the berries are bluish, not yellow. The divisions of the leaves are much the same, excepting the secondary segments of the central division, which are shallow, obtuse and recurved.” (The Palms of British East India, by W. Griffith, in M‘Clelland’s Calcutta Journal of Natural History, No. 19. October 1844, pp. 341, 342.)

*Chamærops Martiana* is described at length in the pages immediately preceding the above, and is said to occur at Bunipa in the valley of Nepal, at about 5000 feet above the sea-level. As Mr. Griffith observes, the two palms are very closely allied: in my opinion they may still turn out to be identical. Among the supposed differences, that of “shorter stature” in *C. Khasyana* is quite unfounded: as I have already noticed, it occurs on Thakil mountain 50 feet high, whereas *C. Martiana* is only quoted at 20: the differences in the leaves may be accidental, for while Mr. Griffith states the lacinixæ of *C. Martiana* to be “glaucous underneath,” and omits any mention of it in the description of *C. Khasyana*, I found it equally true of the latter on the Gagur range. His description of the inflorescence and fruit is (note to page 340) chiefly from Martius in ‘Pl. As. Rar.’ iii. p. 5. t. 211, where, however, Mr. Griffith pronounces that “the representation of the inflorescence is probably quite wrong” (p. 341): and I suspect that the “yellowish,” not “blue” fruit, may merely be due to the immature stage in which the former were observed; such at least is the case in others of this family: for instance, *Phoenix humilis*, before mentioned as common about Almorah, which exhibits various shades of yellow when unripe, but as it matures becomes of a dark blue. This plant Mr. Griffith was inclined to identify, very justly I believe, with *Phoenix acaulis*, from which to *Ph. sylvestris*, the common wild date tree of India, he observes (p. 352) that *Ph. dactylifera* and *farinifera* form complete transitions. I adopt Dr. Royle’s specific name *humilis*, in preference to *acaulis*, as the shrub has frequently a stem several feet high, and may occasionally be observed in all gradations up to a tree of 50 feet. Young plants of the dwarf variety proper to Almorah are now flourishing at the Botanic Gardens, Edinburgh, and Glasnevin near Dublin.